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JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

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OREGON RULES ON LINE CONSTRUCTION.

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Where to Buy It in the West, Pages 9, 10. **Alphabetical Index to Advertisers, Page 8.**

Something just a little different from the ordinary run of socket or receptacle —

You have often wished for this very thing to help you out of a "corner."

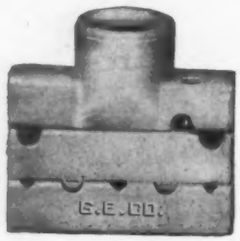
No need to wish —

Get acquainted with the line of

660 watts GE 250 volts

Porcelain socket for decorative wiring

660 watt 250 volt socket



Porcelain receptacle with sub-base for guy wire construction in decorating

Quick Make and Break Sockets and Receptcales

Convenient, readily installed time savers.

The new key socket takes the place of the keyless socket and switch, while the quick make and break interior is so arranged it can be used either in a Multi-Catch or Fluted-Catch socket and receptacle shells.

A few other handy appliances are pictured herewith—there are many more—specially made to meet unusual situations encountered by the wire man.

Know this new line. It has many features that are money makers for you.
Drop a line and we'll gladly tell you all about it.

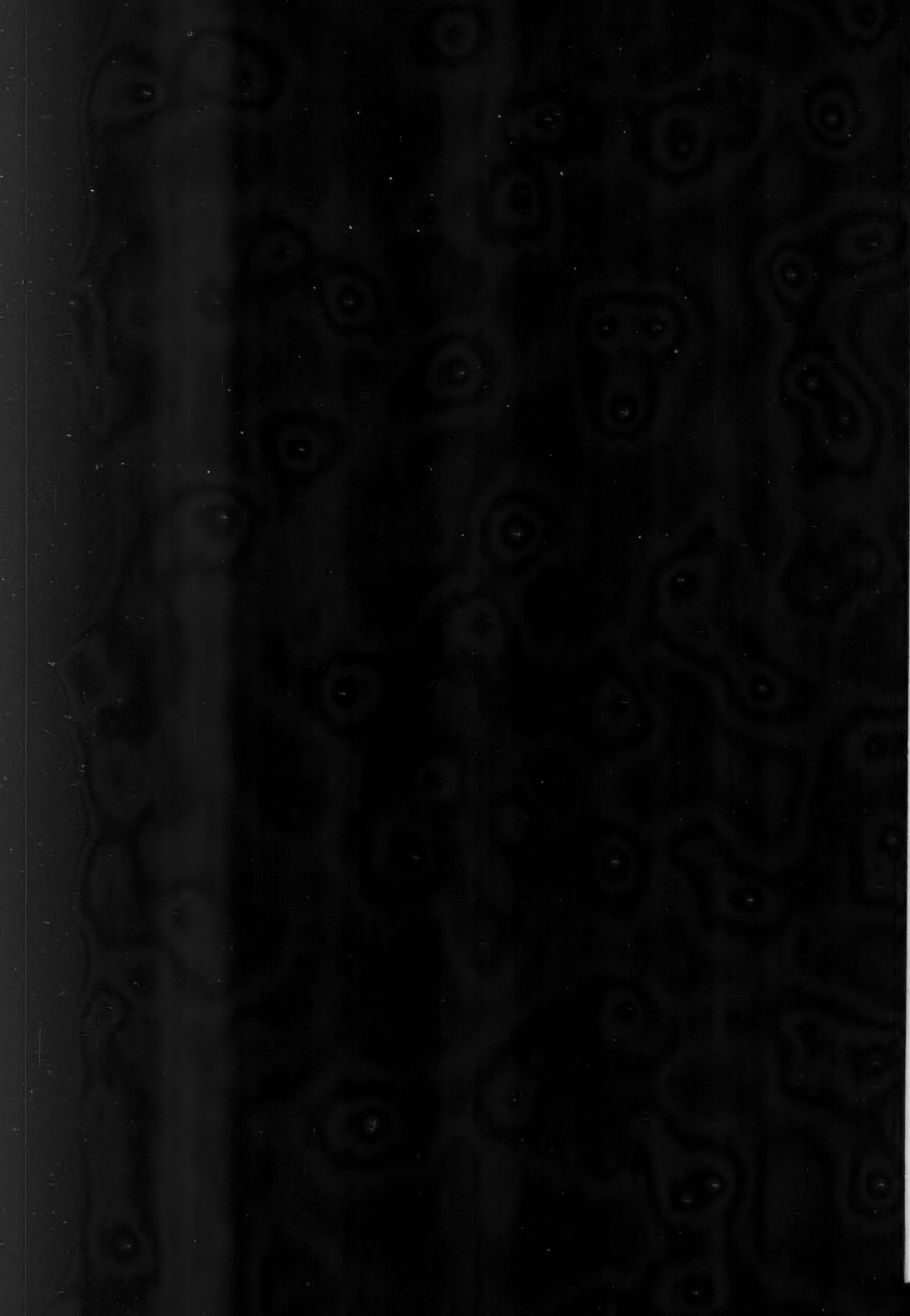
PACIFIC STATES ELECTRIC CO.

The Modern Electrical Supply House

Distributors for the Pacific Coast

SAN FRANCISCO OAKLAND LOS ANGELES PORTLAND SEATTLE

THE PACIFIC STATES ELECTRIC CO.
SERVES THE PACIFIC COAST



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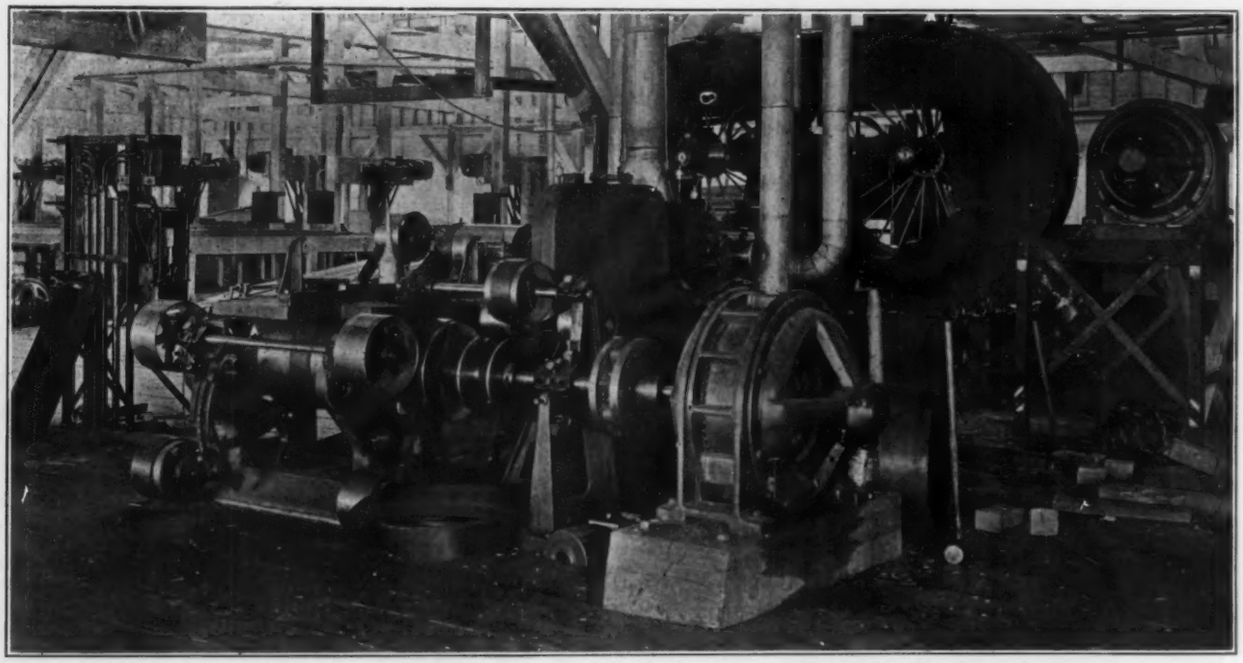
ELECTRICITY IN THE PLANING MILL

BY E. J. BARRY.

The inherent advantages of electric drive are well illustrated in the latest addition to the list of planing mills of the Pacific Coast. In June the St. Paul & Tacoma Lumber Company, of Tacoma, Washington, placed in service their new planing mill, equipped with the latest and best devices for the economical production of finished lumber. Last year their old planing mill and one of the sawmills were destroyed by fire, and it was then planned to build the best mill on the Coast. Whether this laudable ambition has been realized is left for others to judge; but there is no question that the mill is a model of its kind and reflects credit on everyone concerned from president to carpenter's helper. As may be seen from the illustrations, the mill is solidly built and is well equipped with sprinkler system and standpipes against fire. The interior is coated with whitewash as a further preventative, while the extensive blower system prevents the accumulation of shavings and sawdust, which if allowed to remain, constitute a fire risk.



Combined Resaw and Planer With Compensator Relay Stands.

Each machine is driven by an individual motor, the absence of line shafting being highly appreciated. The total output of the planing mill is 300,000 ft. every day of ten hours, and the total connected load is 1192 h.p.

As money is made or lost in the re-handling of lumber, every effort is directed to reduce this factor to a minimum. The fast feed planers are equipped with feed tables which operate much on the principle of a repeating rifle: You load the table with boards and they are shot through the planer as fast as the machinery will operate, that is to say, up to a speed of 250 ft. per minute.

The paving block machine is the first on entering from the south end of the mill, and is driven by a 75 h.p. motor. There are 15 saws of 25 in. diameter mounted on the arbor, spaced 4 in. apart. A conveyor driven by the same motor carries the block material past the saws, and they emerge as blocks on the other side. The blocks drop into a conveyor which loads steel cages mounted on wheels, and the cages are then transferred by electric locomotives to the creosoting

Trim Saws With Individual Motor Drive.

department, and after treatment there, are ready for shipment. The capacity of this machine per day is from 75,000 to 100,000 blocks.

The next machine is a 20 x 16 in. Berlin surfacer, that is to say, it is capable of handling timbers of this size. A 50 h.p., 1200 r.p.m. motor is used to drive this machine. Heavy timbers for building constructions are surfaced by this machine. A 15 h.p. motor drives the rip saw next to the surfacer; the rip saw gets through a lot of work in a day.

A Fay & Egan gattling gun moulder is the next in line, turning out mouldings; 20 h.p. is required for this operation.

Following is a No. 108 Berlin moulder for heavier material, taking a motor of 35 h.p.

A 64 in, resaw driven by a 50 h.p. motor resaws lumber to required thicknesses; an indispensable machine for planing mill work.

The next machine is a combined resaw and planer, as shown in illustration, and while rather a novelty on the coast, has done good work elsewhere. Here,

Blower System for Removing Shavings.

as in all industries where it is possible to combine two operations in one, the cost of production is cheapened to that extent. Various kinds of lumber call for surfacing on one side only, so the material is planed top to bottom, and is resawn as it passes out of the machine.

A 50 h.p. motor is used for the planer, and a like one for the resaw. The motor for the planer is direct connected, but a silent chain drive is used on the resaw to allow a 2½ in. movement of the heads.

The relays of each motor are connected in series so that a mishap to one will throw the other out. This to prevent the planer driving lumber at full speed against the saw when its motor has stopped.

Two 15 in x 6 Berlin planers follow, driven by 75 h.p., 1200 r.p.m. motors.

Next in line is a 9 x 6 Berlin Machine driven by a 50 h.p. motor, and following respectively a Fay & Egan planer and a S. A. Woods planer, both 15 x 6 and driven by 50 h. p., 1200 r.p.m. motors.

Attached to each of these five machines and driven by an individual 15 h.p. motor, are profilers to cut various grooves and beadings in the finished lumber.

As the lumber passes through the planers it is trimmed to the proper lengths by small swing saws, of which there are sixteen, each driven by a 3 h.p. motor. These are shown in the illustration.

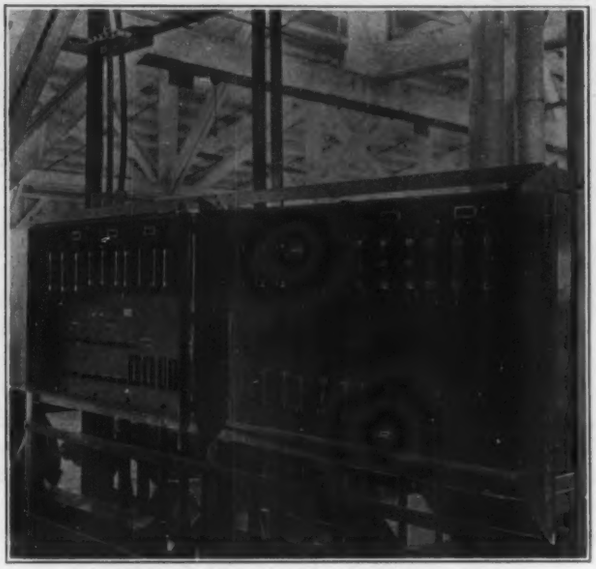
The cuttings from the trim saws drop down a chute into a motor driven conveyor which carries them to a hopper outside the mill, for disposal. The lumber, cut to proper dimensions, drops on a revolving belt conveyor, and is taken to the grading table. After sorting, it is loaded on small cars, ready for rail or water shipment.

The blower system is driven by two 150 h.p. motors, and a suction pipe is brought to every machine.

The wiring throughout, both for power and lighting, is installed in galvanized conduits, with the object of securing fireproof and mechanically and electrically sound construction. A temporary service is obtained from the local Tacoma Railway & Power Company, but a 1000 kw. General Electric Curtis turbo generator has been installed and will be placed in operation as soon as possible. The mill refuse must be destroyed, and use will be made of the steam generated and now going to waste.

The service is brought in at the south end of the mill, and consists of four 350,000 c.m. rubber-covered cables arranged in multiple, twelve cables in all. The conduit is carried under the floor wherever possible, and care has been taken to install it with a view to appearance as well as utility.

The main feeders supply two panel cabinets designed by the writer and built by Evans-Dickson Company, of Tacoma. The bus bars are accessible from the rear, leaving the fuse mountings in the front of



Front View of Distributing Panel.

the panel clear of cables. In operation, the doors at front and back of cabinets are kept closed, and the insides of doors are lined with asbestos over the steel to prevent arcing trouble, should by any means a fuse be jarred loose. The fuses are readily accessible to cut a circuit out of service, should such be necessary, without in any way interfering with the operation of other machines.

A majority of the motors used throughout are the General Electric Company's type K.

Overload relays are used throughout instead of fuses in the running position, and the writer is a firm believer in the use of relays for motor protection. One can tell at a glance if a relay has been tampered with, but a refilled fuse of heavy capacity can easily give fancied protection.

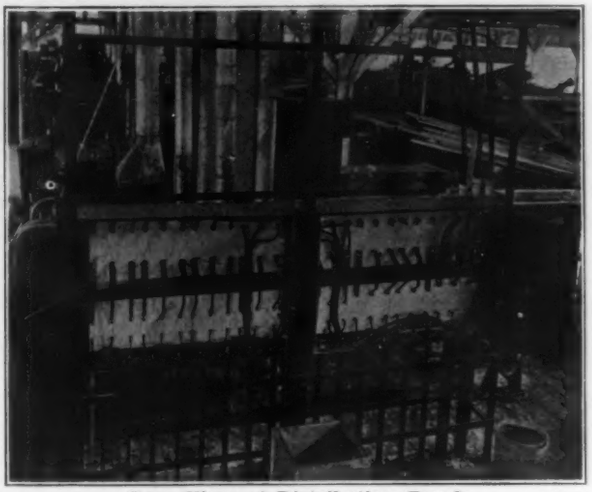
The annoyance of a motor continually dropping out will soon cause the operator to report to someone in authority and give the opportunity perhaps to prevent serious injury to the machine as well as the motor. The temptation to replace a fuse with a strip of metal or a handy nail is well known to anyone experienced in industrial power work.

Planing mills are rather noisy when in operation, and a signal system has been designed to ensure that the machines receive attention when required. When an operator wishes to call a machinist to make an alteration or repairs, he steps to the nearest post and switches on a red light, showing on the glass the number of his machine. He then pulls the cord of a whistle operated by compressed air and the machinist has only to look up to discover where he is wanted.

The lighting throughout is by metallic filament of from 60 to 250 watt capacity, and the control is from the filing room above the planing mill floor.

Individual lights and pilot lights are supplied from a separate distribution board, while the general lighting is controlled by six triple pole 50 amp. switches controlling lighting panels distributed through the mill.

The lighting system is entirely separate from the power, so that an accident to the power feeders would



Rear View of Distributing Panel.

not leave the mill in darkness. This also permits of better voltage regulation.

At all points electricity has proven its efficiency in planing mill work and in particular in the manner it is possible to keep the speed of production at the desired level, the lagging speed of an over-loaded engine is easier to observe than rectify. It is clean and changes and extensions are easy to make.

Everett G. Griggs.

President E. G. Griggs of the St. Paul & Tacoma Lumber Company has long been an advocate of electric drive, and the electrical profession has reason to appreciate the efforts of such progressives, without whose co-operation electricity in the lumber industry would not hold the place it does, and the future it has in store.

ELECTRICAL PUMPING AND IRRIGATION

CONSTRUCTION OF CONCRETE PIPE LINES.

BY B. A. ETCHEVERRY.

Excavation of the trench should be sufficiently deep to have an earth covering of at least 12 in. and preferably 18 in., or even more. The bottom of the trench should be evenly graded to avoid short siphons which may produce air chambers in the pipe. The width of the trench should be larger than the outside diameter of the pipe by about 12 in. to allow the pipe layers sufficient space in which to work. The trench width and depth with the cost of excavation are given in the table below, based on an 18 in. depth of earth covering. The cost of excavation and backfilling is assumed at 20 cents a cubic yard.

Cost of Excavation for Cement Pipe Lines in Cents Per Lineal Foot.

Size of pipe. Inches.	Depth of trench. Inches.	Width of trench Inches.	Excavation in cu. yds. per lineal foot.	Cost of excavation in cents
6	26	20	.13	2.6
8	28	22	.16	3.2
10	31	25	.20	4.0
12	33	27	.23	4.6
14	35	29	.27	5.4
16	38	32	.32	6.4
18	40	34	.35	7.0
20	42	36	.38	7.6
24	47	41	.50	10.0
26	49	43	.55	11.0
30	54	48	.66	13.2
36	60	54	.83	16.6

In laying the pipe it is placed in the trench standing on end with the bell or groove end up. To lower the large pipes more easily they may be slid on a chute or skid made of timber. The pipe sections are

Laying Hand Tamped Cement Pipe.

joined with a mixture of 1 part of cement to 2 of fine sand. The taper end of the pipe which has already been laid, and the bell end of the pipe to which it is to be joined, are brushed clean and well wetted with a fiber brush. About an inch of the soil under the bottom of the joint to be made is removed and a trowel full of mortar is spread in its place to form a bed of mortar. The bell end of the pipe which is standing on end is filled with cement mortar and is jammed against the taper end of the previously laid pipe. The mortar which is squeezed out on the inside of the joint is wiped with a wet brush to form a smooth joint. To complete the joint a band of mortar from 2 to 3 in. wide and ¼ to ½ in. thick is formed on the outside of the pipe.

It is always preferable to lay the pipe uphill to avoid the shrinkage at the joints due to the pipe pulling away. It is well to protect the bands from the action of the sun for about 30 minutes before backfilling by using wet burlap or by placing a board over them. To raise a pipe and hold it on grade do not use clods but shovel in dirt and compact it by tamping. The bands should be wetted before backfilling. Backfilling must be done carefully by shoveling the earth free from rocks, around the pipe and tamping it until the pipe is well covered. This, however, is not so essential with loose sandy soil which naturally packs very easily. The pipe should not be used for at least 2 to 3 days, especially if under pressure, to give sufficient time for the bands to harden.

In the accompanying table is given information regarding the laying and hauling of cement pipe, based on the wagon and cost of material given above. Two per cent has been allowed for supervision, organization, breaking of pipe and miscellaneous.

Cost of Laying and Hauling Cement Pipe, in Cents per Lineal Foot.

Diameter in inches.	Weight of pipe in pounds per foot.	Number of feet laid per barrel of cement.	Number of men in laying crew.	Number of feet laid per day.	Cost of laying, exclusive of trenching and hauling, in cents per foot.	Cost per foot of hauling two miles.
6	20	500	3	600	2.25	.9
8	32	400	3	600	2.50	1.4
10	42	350	3	500	3.00	1.9
12	56	300	3	450	3.50	2.5
14	69	225	3	400	4.00	3.1
16	85	200	3	300	5.00	3.8
18	100	175	4	300	6.25	4.5
20	110	150	4	300	6.60	5.0
24	160	100	6	300	10.00	7.2
26	175	85	6	250	12.0	7.9
30	220	75	6	200	14.0	9.9
36	320	60	7	200	17.0	14.4

The cost data given in the preceding tables are assembled and given below.

Cost of Making, Laying, Trenching and Hauling Cement Pipe in Cents per Lineal Foot.

Diameter of pipe in inches.	Cost of making. 1:3 pipe.	1:4 pipe.	Cost of laying.	Cost of trenching.	Cost of of hauling two miles.	Total cost. 1:3 pipe.	1:4 pipe.
6	10	7	2.25	2.6	.9	15.75	12.75
8	12	9	2.50	3.2	1.4	19.10	16.10
10	15	11	3.00	4.0	1.9	23.90	19.90
12	20	15	3.50	4.6	2.5	30.60	25.60
14	25	20	4.00	5.4	3.1	37.50	32.50
16	30	25	5.00	6.4	3.8	45.20	40.20
18	35	30	6.25	7.0	4.5	52.75	47.75
20	43	35	6.60	7.6	5.0	62.20	54.20
24	60	50	10.0	10.0	7.2	87.20	77.20
26	75	63	12.0	11.0	7.9	105.90	93.90
30	85	70	14.0	13.2	9.9	122.10	107.10
36	115	95	17.0	16.6	14.4	163.0	143.00

These cost values agree quite closely with those given below which are those obtained for about 5 miles of pipe on the irrigation system of the Fruitlands Irrigation & Power Company near Kamloops. The concrete mixture used was composed of 1 part of cement to 2½ of sand and 1½ of stone, which corresponds to a 1 to 3 mixture of cement and pit gravel. Cement cost $3 a barrel, sand 75 cents a cu. yd, crushed

rock $2.50 a cu. yd., common labor $2.50 per day, skilled labor $3 to $3.50 per day, and teams $5 per day. The cost given includes all materials, labor, supervision, and depreciation on plant.

Cost of Making and Laying Concrete Pipe on Irrigation System of Fruitlands Irrigation & Power Co., Near Kamloops.

Diameter of pipe. Inches.	Cost of making. Cents.	Cost of laying. Cents.	Total cost. Cents.
8	11.1	....	....
10	15.7	....	....
12	20.	11.	31.
16	29.5	15.5	45.
20	39.5	20.3	59.8
24	54.7	23.3	78.

Other Methods of Making Cement Pipe.

The lack of uniformity in the pipe made with a dry mixture tamped by hand as described above and the porosity of the pipe, have led to other processes of making pipe, some of which are still in the experimental stage. Two methods have been used, machine tamping and the wet process.

Machine tamped pipe is made by a number of plants in the West, including one at Peachland. The pipe is made with a comparatively dry mixture much in the same manner as hand made pipe, but the mixture is thoroughly tamped by a mechanical tamper of small cross section which tamps rapidly and gives a high degree of compression. The inside core also rotates during the tamping processes and this gives the inside of the pipe a very smooth surface. The pipe obtained by this process is very dense. It should be uniform and superior to the handmade pipe, especially when a pipe is desired for pressure heads greater than the handmade pipes will stand. The pipe is made with a bell similar to sewer pipe. This requires more material than the shiplap end obtained with the handmade pipe, which increases the cost.

To make pipe by the wet process, a wet mixture of cement mortar or cement concrete is poured in the mould and after the mixture has hardened, the moulds are removed. As this takes several hours, only a few pipes can be made per day. For a large output several moulds would be needed and the cost of the plant would be high. However, the moulds need not be as strong as those used for hand tamping and could be obtained at a much smaller cost. The increased cost of plant would be overbalanced if a large quantity of pipe was made by the saving in labor and also by the saving in cost of material because a pipe equal in strength and impermeability could be obtained with less cement. To reduce the number of moulds it has been attempted to accelerate the hardening of the mixture by heating it with steam. This process, however, is still in an experimental stage. The U. S. Department of Agriculture, through its Irrigation Investigations Office, is investigating the wet method of making pipe. The U. S. Reclamation Service has also devised methods of making a wet mixture cement pipe at a reasonable cost for the Tieton irrigation project in Eastern Washington, and for other projects. Their results have not yet been published.

Ebonite of the best quality should withstand a voltage gradient of 125,000 volts per mm.

OREGON REGULATIONS ON LINE CONSTRUCTION.

The Railroad Commission of Oregon has prepared tentative general regulations governing overhead and underground construction of telegraph, telephone, signal, trolley and power lines throughout the State. These regulations apply to new construction in Oregon and are not to be construed as limiting the right of the commission to change any installation that is believed to be hazardous. It is not intended, by these general regulations, to supersede any local municipal regulations or ordinances.

Overhead Clearance.

1. Railroads and Street Railroads:

a. When telegraph, telephone or signal lines, or power lines of not exceeding 600 volts, cross above railroads or street railroads, a minimum clearance of 25 ft. shall be provided, except that the clearance above trolley wires and trolley feeders hereinafter specified (Section 1-c) shall in all cases be observed.

b. When power lines, other than trolley wires and trolley feeders, which transmit power at from 600 to 15,000 volts, cross above railroads or street railroads, the minimum clearance shall be 28 ft. When such lines transmit power in excess of 15,000 volts the minimum clearance shall be 34 ft.

c. When trolley wires or trolley feeders cross above railroads or street railroads, a minimum overhead clearance shall be provided of 23 ft., or otherwise as specified in Section 5 of this order.

2. Streets and Public Highways:

Telegraph, telephone and signal lines, and power lines of not exceeding 600 volts, which cross above streets or public highways, shall have a minimum overhead clearance above the surface thereof of 20 ft.; power lines of from 600 to 15,000 volts, 24 ft.; power lines of above 15,000 volts, 30 ft.; and trolley wires and trolley feeders, 19 ft. The minimum clearance for such lines, above railroads and street railroads which occupy streets and public highways, hereinbefore specified in Section I, shall in all cases be observed.

3. Telegraph, Telephone and Signal Lines:

Telegraph, telephone and signal lines, at crossings with telegraph, telephone or signal lines of other companies, shall have a minimum clearance, above or below such lines, of 2 ft., unless suitably supported to prevent contact; above trolley wires or trolley feeders, 4 ft., except for properly protected cables, when 2 ft. will be permitted; below power lines of 600 volts or less, 2 ft.; below power lines of from 600 to 5000 volts, 4 ft.; below power lines from 5000 to 15,000 volts, 6 ft., and below power lines of exceeding 15,000 volts, 8 ft.

4. Power Lines—Other than Trolley Wires and Trolley Feeders:

a. Power lines, other than trolley wires and trolley feeders, of not exceeding 600 volts, shall have a minimum clearance above rails at crossings with railroads and street railroads of 25 ft.; above streets and public highways, 20 ft.; above telegraph, telephone and signal lines; 2 ft.; above or below other power

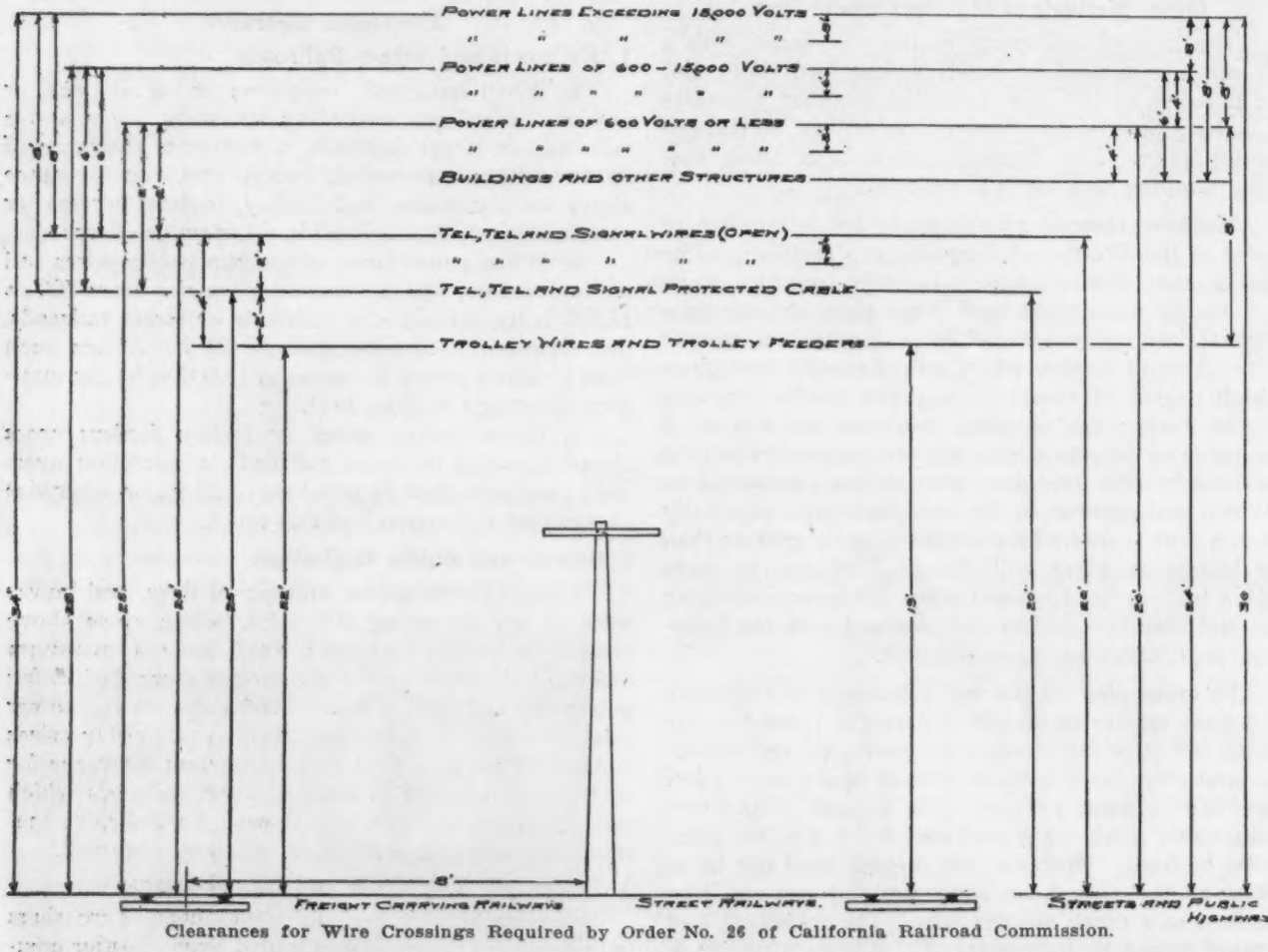
lines or not exceeding 600 volts, unless suitably supported to prevent contact, 2 ft.; above all trolley wires and trolley feeders, 4 ft.; above or below other power lines of from 600 to 5000 volts, 4 ft.; below other power lines of from 5000 to 15,000 volts, 4 ft.; below other power lines of exceeding 15,000 volts, 8 ft.; and above all buildings and structures, 4 ft.

b. Power lines, other than trolley wires and feeders of from 600 to 15,000 volts, shall have a minimum clearance above rails at crossings with railroads and street railroads, of 28 ft.; above streets and public highways, 24 ft.; above telegraph, telephone and signal lines, for power lines of from 5000 down to 600 volts, 4 ft., and for power lines of from 5000 to 15,000 volts, 6 ft.; above or below other power lines of not exceeding 600 volts, 4 ft.; above or below other power lines of from 600 to 15,000 volts, 6 ft.; below other power lines of exceeding 15,000 volts, 8 ft.; and above all buildings and structures, 6 ft.

c. Power lines of exceeding 15,000 volts shall have a minimum clearance above rails at crossings with railroads and street railroads of 34 ft.; above streets and public highways, 30 ft.; above telegraph, telephone and signal lines, 8 ft.; above other power lines of not exceeding 15,000 volts, 8 ft.; above or below other power lines of exceeding 15,000 volts, 8 ft.; and above all buildings and structures, 8 ft.

5. Trolley Wires and Trolley Feeders:

Trolley wires and trolley feeders or railroads, and street railroads which transport or propose to transport standard freight cars; shall have a minimum clearance above their own rails of 23 ft., and of other street railroads, 19 ft., provided, that when street railroads which do not transport or propose to transport standard freight cars are on streets or public highways which cross under other railroads, such minimum clearance of the trolley wire above rails shall be 13 ft. and 6 in. Such trolley wires and trolley feeders shall have a minimum clearance at crossings above the rails of other railroads and street railroads which transport or propose to transport standard freight cars, of 23 ft.; and above other street railroads, 19 ft.


POWER LINES EXCEEDING 15000 VOLTS
POWER LINES OF 600 - 15000 VOLTS
POWER LINES OF 600 VOLTS OR LESS
BUILDINGS AND OTHER STRUCTURES
TEL, TEL AND SIGNAL WIRES (OPEN)
TEL, TEL AND SIGNAL PROTECTED CABLE
TROLLEY WIRES AND TROLLEY FEEDERS
8'
FREIGHT CARRYING RAILWAYS
STREET RAILWAYS.
STREETS AND PUBLIC HIGHWAYS.

Clearances for Wire Crossings Required by Order No. 26 of California Railroad Commission.

Trolley wires and trolley feeders shall have minimum clearance below telegraph, telephone, signal and power lines as hereinbefore provided.

6. All power lines transmitting power at 15,000 volts and in excess thereof, and which cross over railroads, street railroads, telegraph, telephone, signal and other power lines, shall be constructed to conform to the "Specifications for Overhead Crossings of Electric Light & Power Lines" adopted at the present time by the joint committee of the National Electric Light Association, the Association of Railway Telegraph Superintendents, and the American Railway Engineering and Maintenance of Way Association, in so far as the same are not in conflict with any of the provisions of the law of the State of Oregon, and except further that the clearance hereinbefore provided in this order, together with the restrictions thereon, shall be observed.

NOTE 1. It will be understood that this Commission adopts the specifications at present issued by the Joint Committee above named and any change, modification or alteration in same which may hereafter be issued or adopted by said Joint Committee will not be applicable to the matters contained in this order until submitted to and approved in formal order by this Commission.

NOTE 2. As an alternative for the construction prescribed in the above specifications, pole of such length may be used for the crossing spans that a wire breaking at any point in the crossing span will swing clear of the wire leads below. As a further alternative, conditions permitting, when such power lines cross telegraph or telephone lines, the latter may be placed underground at the crossing span.

NOTE 3. As an alternative, conditions permitting, telegraph and telephone lines and power lines of less than 600 volts may be placed underground wherever they cross railroads or street railroads.

NOTE 4. The minimum clearance for wire lines hereinbefore provided shall have reference to clearances which will obtain under the most unfavorable conditions of temperature and loading in the district concerned, provided that the prescribed factors of safety are observed.

Construction.

7a. The minimum size of wire to be used where power lines cross above railroads or street railroads, telephone, telegraph or power lines shall be as specified or their equivalent in strength.

For power lines other than trolley wires and feeders of less than 600 volts—No. 10 B. & S. G. Copper.

For power lines of more than 600 volts and less than 5000 volts—No. 6 B. & S. G. Copper.

For power lines of over 500 volts, series or constant current circuits excepted—No. 4 B. & S. G. Copper.

7b. At crossings as specified under 7a where wooden poles are used, the maximum length of span for wires carrying voltages above 600 shall be 150 ft., and only the best selected poles of a minimum diameter of 7 in. shall be used.

8a. When more than one cross arm is mounted on a pole, no cross arm supporting a wire or cable carrying a voltage in excess of 600 shall be placed within a distance less than 4 ft., measured center to center, from any other cross arm supporting a wire or cable carrying a voltage of less than 600.

8b. No wire or cable carrying a voltage in excess of 600 shall be placed within a distance less than 14 in., measured from center to center of insulator, from any other wire or cable on the same cross arm, provided that this minimum spacing shall not apply to wires of the same potential.

8c. No wire or cable shall be placed on any pole support within a distance of 15 in. from the center line of said pole, provided that telephone, telegraph and signal wires may be placed within a distance of 15 in.; and provided that this rule will not apply to wires or cables run vertically from underground, or to wires run from circuit wires to lamps or transformers supported on the same pole, or to telephone cables supported by messenger cables.

9. No guy wire or guy cable attached to any pole or appliance to which is attached any wire or cable used to conduct or carry electricity shall be placed without causing said guy wire or guy cable to be effectively insulated at all times at a distance of not less than 4 ft. nor more than 8 ft. (measured along the line of said wire or cable) from the upper end thereof and at a point not less than 8 ft. vertically above the ground from the lower end thereof; provided that no insulation shall be required at the lower end of a guy wire or cable where the same is attached to a grounded anchor. This regulation shall not apply to guy wires or cables attached to poles carrying telegraph, telephone or signal wires and cables, or to power wires or cables carrying a voltage of less than 600, and which are situated outside the corporate limits of any town or city.

10. Fixtures placed or erected for the support of wires on the roofs of buildings shall be of sufficient strength to withstand all strains to which they may be subjected, due to the breaking of all wires on one side thereof, and, except where insulated wires or cables are held close to fire walls by straps or rings, shall be at such a height as to give the clearances herein specified for structures, and any wire or cable carrying a voltage in excess of 600 shall be marked with the word "Danger" in letters at least 3 in. high on the supporting structure and at all other points where there is a hazard.

11. In all cases where wires which are conductors of electricity are strung above or below lines which are used to carry electricity in excess of 600 volts, suitable appliances shall be furnished the workmen to guard against accidents, e. g., drag ropes, insulated clamps, insulated loops and other appliances which will prevent contact with the wires carrying electricity in excess of 600 volts in any manner or event.

12. When lines of 600 volts or over are cut out at station or substation to allow employes to work upon them, they shall be short-circuited and grounded at the station, and shall, in addition, if the line wires be bare, be short-circuited, and when possible grounded at the place where the work is being done.

Location.

13a. Telephone and telegraph lines, and telephone and power "drops" or "service wires" must be placed below power wires carrying 600 volts or over at the clearances hereinbefore specified. Where it may be shown to be impracticable to string telephone and telegraph wires below power wires which are used to carry in excess of 600 volts, the telephone or telegraph line must employ the same mechanical strength of construction as would be required in case said power lines were constructed over the telegraph, telephone and signal lines.

13b. Power lines of more than 600 volts shall be constructed along one side of any public highway and telegraph, telephone and signal lines shall be constructed on the opposite side of said public highway unless it is shown to be impracticable.

13c. No company shall construct a pole line which will parallel "overbuild" or "underbuild" any existing pole line without first giving such other company reasonable notice in writing of its intention to do so, provided that this provision shall not apply to wires crossing over or under existing wires at an angle.

General.

14. The neutral point or wire of all transformer secondaries strung or erected for use in low potential distributing system shall be grounded in all cases

where the normal maximum difference of potential between the ground and any point in the secondary circuit will not exceed one hundred and fifty (150) volts. When no neutral point or wire is accessible, one side of the secondary circuit shall be grounded in the case of single-phase transformers, and any one common point in case of interconnected polyphase bank or banks of transformers. Where the maximum difference of potential between the ground and any point in the secondary circuit will, when grounded, exceed one hundred fifty (150) volts, grounding shall be permitted. Such grounding shall be made by connecting a wire or wires not less than No. 6 B. & S. gauge to: (a) A water pipe of a metalic system; (b) A copper plate 1/16 in. thick and not less than 3 ft. by 6 ft. area buried in coke below the permanent moisture level; (c) Other device equally as efficient.

15. Transformers, either single or in bank, that exceed a total capacity of ten kw. shall be supported by a double cross-arm or some fixture equally as strong. No transformer shall be placed on any cross-arm or other appliance on a pole upon which is placed a series electric lamp.

16. Any change in the characteristics of a line which carries or is to carry voltage in excess of 5000 shall be reported to the commission.

17. As between any two wires or cables carrying different voltages mentioned in these rules, only the wires or cables so placed last in point of time shall be held in violation thereof.

Underground.

18. No manhole containing any wire carrying a current of over 300 volts shall be less than 6 ft. from floor to inside of roof; if circular in shape it shall be 6 ft. from wall to wall; provided however, that this paragraph shall not apply to any manhole in which it shall not be required that any person enter to perform work; provided further, that the foregoing provisions of this paragraph shall not apply where satisfactory proof shall be submitted to the proper authorities that it is impracticable or physically impossible to comply with the law within the space or location designated by the proper authorities.

19. All manholes containing any wires or appliances carrying electrical current shall be kept in a sanitary condition, free from stagnant water or seepage or other drainage which is offensive or dangerous to health, either by sewer connection or otherwise, while any person is working in the same.

20. No manhole shall have an opening to the outer air of less than 26 in. in diameter, and the cover of same shall be provided with vent hole or holes equivalent to three square inches in area.

21. No manhole shall have an opening which is, at the surface of the ground, within a distance of 3 ft. at any point from any railway or street car track; provided, that this shall not apply where satisfactory proof shall be submitted to the proper authorities that it is impracticable or physically impossible to comply with the provisions of this paragraph; provided, that in complying with the provisions of this rule only the construction last in point of time performed, placed or erected shall be held to be in violation thereof.

22. Whenever persons are working in any manhole whose opening to the outer air is less than three feet from the rail of any railway or street car track, a watchman or attendant shall be stationed on the surface at the entrance of such manhole at all times while work is being performed therein.

23. There shall be provided cutout switches on all primary and secondary wires in all manholes where the wires are connected with transformers or other electrical devices therein.

24. All persons employed in manholes shall be furnished with insulated platform so as to protect the workmen while at work in the manhole; provided, that this paragraph shall not apply to manholes containing only telephone, telegraph or signal wires or cables.

MULHOLLAND'S REPORT ON LOS ANGELES AQUEDUCT.

The annual report of William Mulholland, chief engineer of the water department at Los Angeles, is largely concerned with the disposition which is to be made of the water from the Los Angeles aqueduct. A line 25.58 miles in length is being constructed from the aqueduct outlet to Los Angeles to serve the city as well as the territory through which it passes, together with the land south of the Santa Monica Range and the mouth of Franklin Canyon, these lands being supplied from surplus water to be stored in the San Fernando reservoir.

The construction of the lower San Fernando dam has progressed at a very satisfactory rate since the work of placing the earth in the main body was begun in the summer of 1912. The earth is being placed by the pumping and sluicing method and is progressing at the present time at the rate of approximately 4000 cubic yards per day, there being approximately 800,000 cubic yards already in the structure. The work of building the gate tower will be begun about September 1, and will probably be completed by the first of the year.

At the south end or exit of tunnel No. 108, which is the point of termination of the aqueduct proper and the point of beginning of the Franklin Canyon line, a substantial and permanent structure has been completed to discharge the aqueduct flow. From this portal a concrete conduit is carried down the summit of a projecting ridge of the mountain range by a steep descent having a fall of 167 ft. in a distance of 1036 ft. and so constructed as to give as near as possible a natural cascade effect to the descending water. While the purpose of this design is mainly esthetic, it has a utilitarian value in thoroughly aerating the water as it flows from the aqueduct.

Natural Cascade.

From the foot of the cascade a concrete conduit passes down approximately through the center of the Upper San Fernando reservoir site and enters a covered conduit at a point below the site of the dam for this upper reservoir. Here it is intended at some future time to construct a power plant. From this point a covered conduit follows the meander of the high-water line on the west side of the lower San Fer-

nando reservoir at the west end of the dam, where it enters a gate tower from which leads the closed or pressure portion of the Franklin Canyon line.

This tower is designed so that it may not alone deliver the water from the by-pass, but also by means of gates with which it is furnished, draw upon the reservoir in case of interruption in the aqueduct flow. The cascade, the open and the covered conduit including two short tunnels, from the outlet of the aqueduct to the tower, a distance of 16,334 ft., have been completed and preparation for the construction of the tower is under way.

Below the gate tower the line consists of steel pipe for a distance of 65,030 ft. to the northerly end of the Franklin Canyon tunnel.

At the lower point of the San Fernando Valley where this pipe crosses the Los Angeles River the pressure will be 115 pounds to the square inch and blow-off gates will be placed here so that, in case of necessity, water can be discharged into and carried in the natural channel of the river to the present headworks plant at the inlet of the main supply conduit. The contingency for this, however, is somewhat remote as the added growth of the city to the southwest will be met by the line at its southerly terminus, thus relieving the draft on the old headworks.

From the dam of the Lower Franklin Reservoir into Los Angeles, the line will consist of a steel pipe sixty inches in diameter down to Sunset boulevard, a distance of 4608 ft., to radiate in lines of smaller diameters, two of which will connect with the mains of the city's present distribution system. One line, thirty-six inches in diameter, will terminate in the thirty-inch cast-iron main along Western avenue at Pico street, and another twenty-four inches in diameter will extend along Santa Monica boulevard through Hollywood. Designs for other branches are not yet worked out.

REDUCTION OF ELECTRIC RATES IN TUCSON, ARIZ.

Effective August 1, 1913, rates for electricity will be greatly reduced through an opinion handed down July 10th by the corporation commission, in the case of Mayor I. E. Huffan against the Tucson Gas Electric Light & Power Company, in which it was urged that the rates were discriminatory. The commission declared that the gas department of the company's business is not earning an amount in excess of a fair rate of return. The commission approved the $5.00 deposit for residence service and $10.00 deposit for store service, for the reason that if these deposits were not required and the company should suffer loss for service unpaid for such loss would directly react upon the customers.

The lighting rate established provides for a maximum charge of 11c per kw.-hr. for the 1st 100 kw.-hr. consumed in any month, with sliding reduction for larger consumption, and a minimum charge of $1.00 per month. The power rate is 10c per kw.-hr. for the first 100 kw.hr. consumed in any one month, with sliding reduction for larger consumption, and a minimum charge of $1.50 for 2 h.p. or less.

THE SOCIETY FOR ELECTRICAL DEVELOPMENT.

BY J. ROBERT CROUSE.

There are always some underlying, basic principles governing all change and progress—whether in the field of research, engineering, manufacturing or merchandising. These principles are of the same essential quality as the axioms in mathematics or refined statements of particular relations, such as $C = E/R$ in our electrical business. Such principles do not depend for their truth or power upon minority or majority assent, and when once fairly stated, are assured of final acceptance since essential progress must be made in harmony with them.

Progress in our electrical business during thirty years (notwithstanding that less than 30 per cent of the population is electrically served) has been one of the wonders of the world; its contribution to the comfort, happiness and efficiency of our modern life are so great that we wonder how a preceding generation did without it. We may justly feel proud of such a magnificent business which in every department of its development is so worthy of our best thought and effort.

The efforts of those engaged in the fields of research, engineering and manufacturing have shown the most marked results, since, while enjoying the stimulus of the friendly rivalry of other men and organizations, they have been free from the sort of competition which makes the accomplishment of useful results expensive and difficult. It is a matter of common observation that rapid progress has been made in discovery and research, in efficient engineering adaptation of discovery to practical manufacture, and improved products tending to better conditions of generation, construction and distributing systems.

However, in the field of selling and distribution we are challenged by the cold fact that no essential progress—meaning by this a decreasing ratio of sales expense to sales—has been generally accomplished. Not only this, but there is a prevailing opinion among the manufactures, jobbers, dealers and contractors that the ratio of sales expense to sales tends to increase. The annual report of some of the largest electrical manufacturers makes specific mention of this tendency as a fact in their operation. Among central stations this is doubtless true, since by common consent they are properly monopolistic for the best results and competitive only with other methods of furnishing service for light, heat, power and other useful purposes.

Our electrical business, technical in its very nature, has doubtless for that reason placed less emphasis in the past on aggressive selling and distributing effort—witness the fact that the first commercial papers in the National Electric Light Association appeared only so recently as 1905, and national advertising by individual companies began about 1907-1908.

It is estimated that the gross sales, ratio of sales expense and sales expense for 1912, in the electrical business, were approximately as indicated in the following table.

Branch of Business.	Gross Sales, 1912.	Per Cent Ratio Sales Expense to Sales.	Sales Expense 1912.
Central Stations	$400,000,000	5%	$20,000,000
Manufacturers and Jobbers	300,000,000	15%	45,000,000
Dealers and Contractors	100,000,000	15%	15,000,000
Total	$800,000,000		$80,000,000

This $80,000,000 of sales effort (which is equal to one-fifth of the gross sales of all the central stations) is incurred by approximately 5,000 central stations, 500 manufacturers, 200 jobbers, 5,000 dealers and contractors—a total of 10,700 organizations. It is of special importance to note that $60,000,000 of this $80,000,000 sales effort is incurred by the manufacturers, jobbers, dealers and contractors who operate under the complete competitive conditions, as a sales expense ratio of at least 15 per cent—and tending to increase.

While this table and the above comments are broad generalizations, the reader is asked to check the principle and its application in his own particular case.

These facts in themselves are a challenge to commercial men, which cannot be avoided. They justify the most careful search for causes and investigation of plans for improvement.

Whatever minor causes may be contributory to this failure in more efficient merchandising, the major one, which experience and the facts disclose, is competition among these thousands of companies, resulting in expensive duplication of all kinds of sales efforts and failure to co-operate in a definite organized plan in those kinds of endeavor which supplement legitimate competition.

This competition is to a very great extent to secure the business held by others or of natural growth—which we may characterize as the existing market. A very large part of the selling effort is exerted on this existing market and dissipated in commercial friction and lost motion, with resulting decrease in its creative effect.

The fact is frequently overlooked that the current consuming devices for light, heat and power and other useful purposes are the only aspects of our business in which the public are or can be interested, while they constitute but a small part of the resulting business from the boilers to the devices the public uses. We are therefore all, without conscious organization, joint sellers of the final service.

The age of business (in which someone has said we live to do business, instead of doing business to live, in the base sense) is in the order of social development the successor to the period when war—the extreme of competition—was the principal occupation. Business has inherited from his prototype many habits of enmity, antagonism and waste, which only the persistent cultivation of good fellowship, harmony and economy will gradually supplant. The most successful organizations which I have observed have given the greatest attention to the cultivation of harmony among their men, and the spirit of progressive, constructive effort. This same result must measurably follow similar conscious effort by an entire industry.

The Society of Electrical Development proposes a broad, common organization of our entire industry: central stations, manufacturers, jobbers, dealers and contractors (controlled by a balanced representation from each), through which a part of this $80,000,000 of unorganized and competitive sales effort can be more effectively exerted through organized and co-operative effort in promoting and popularizing electrical service. These plans to teach the public to "Do it electrically"—many more than can at once be undertaken—have been worked out and endorsed as entirely practical by many prominent men in our business.

The Society proposes at the start that a minimum of $200,000 or but one-fourth of one per cent of this $80,000,000 of competitive sales expense, be co-operatively expended. The basis of subscription is for manufacturers, and central stations, one-fifteenth of one per cent of gross sales, and one-twentieth of one per cent for jobbers, dealers and contractors, amounting, for illustration, in the case of the former, to $66.66 per $100,000 of gross business, and in the latter to $50 per $100,000 of gross business—the subscription being on an annual basis. This means in the case of a company having a 15 per cent sales expense account, but one-three-hundredth of their sales appropriations. There are few organizations which cannot locate competitive expenses of doubtful value equal to the Society's subscription. While individual subscriptions are comparatively small and in no sense burdensome, yet general co-operation in the movement will make a fund of $500,000 per annum available for progressive and aggressive market cultivation along these new lines.

This Society creates the organization and the fund through which some of our dollars can co-operate with the good will of us all in broad effective activity for the expansion of the market, while we continue with the most of our dollars to compete for our fair share.

This plan means progress in the direction of more efficient distribution of electrical service through joint cultivation of our common market—the great preoccupied, incredulous, money-spending public—a result which our present systems neither accomplish nor promise ever to achieve on the old lines.

The plan presents a new kind of consolidation for sales efficiency through a better balance of competitive and co-operative effort to which the popular thought will not now nor in the future take exception.

The plan means that electrical men—identified with this most wonderful of all business—will demonstrate for themselves and by example for others—the true principles which underlie progress in more efficient sales distribution, through the creative cultivation of the market. The plan lends dignity to the art of selling—synonymous in the best sense with service—and marks a further point in the age now happily passing, when the selling spirit was symbolized in the economist's expression "Caveat Emptor"—"Let the buyer beware."

The emergency telephone outfit of forest rangers, used chiefly in fighting fires, consists of small instruments and a coil of fine copper wire. The wire is attached to the nearest telephone line, an army bayonet is thrust into moist ground at the other end, and with the circuit thus completed the ranger can talk with headquarters, report his position, and summon fire fighters if necessary.

SMOKE AND COMBUSTION.

BY M. CECIL DAVIS.

(The following remarks on a problem of vital interest to engineers are taken from a paper presented by the author before the Smoke Problem Committee of the Commonwealth Club of California.—Ed.)

There are various oils burners used throughout the steam plants, almost every engineer using a different kind. Some of the large plants have adopted a burner which has been proven from scientific experiments and conditions to be not only economical in fuel, but also a smoke preventative. The primary cause of smoke is incomplete combustion, caused by defective and badly regulated burners, and the inefficiency of the fireman.

The burning of fuel is accomplished by bringing the oxygen of the air into intimate contact with the combustible elements under proper conditions of temperature. In the calorimeter we get the total heat from fuel by using oxygen under pressure so that perfect mixture ensues, giving the desired chemical combination. In the furnace, good combustion is accomplished in the following manner: The volatile matter driven off from the fuel combine with air in the ratio of one part of carbon to two of oxygen to form carbon dioxide CO_2. The volatile matter or hydro-carbons must first pass into a gaseous state and mix thoroughly with hot air, forming CO_2 and hydrogen which combines with oxygen and forms water in the condition of steam, due to the high temperature. Theoretically, this is complete combustion.

Incomplete combustion takes place first by insufficient or incomplete mixture of air, allowing the CO_2 from the fuel to combine with more carbon to form CO. The hydro-carbons mixed with cold air pass off unconsumed, or if raised to a red heat and without sufficient air disengage the carbon in fine powder and pass to the condition of moist gas and hydrogen. The higher the temperature under the conditions of sufficient air, the greater the proportion of carbon powder, and when the carbon powder is below the temperature of ignition, before coming in contact with oxygen, it passes off as smoke. For a complete combustion it is necessary to have not only sufficient air, but it must be intimately mixed at the right place, which is the oil burner or the fire box. Too much air is a detriment because it absorbs the heat and acts to some extent as an insulator between the hot gases and the heating surface. Smoke is unnecessary and positively wasteful. It is a constant and visible proof of imperfect combustion of fuel, and therefore evidence of a waste of part of the fuel. This waste, however, is not nearly so important to the owner of the establishment as the losses of heat and power that are its inevitable concomitants, the points to which I wish to direct your attention of, are:

First that a smokeless stack does not always denote high furnace efficiency, but when it does not, the fault always lies with the engineer. Second, that the making of smoke means direct waste of money to the manufacturer. Third, that a steam jet of any kind should not be used as an abater. Fourth, to improve a steam plant, we should begin at the boiler and not at the engine. Fifth, that sufficient area and proper arrangement of the combustion chamber are among the principal factors in smoke abatement. Sixth, that the smoke makers have their own protective devices so as to arrange their plants as to render them practically smokeless, that steam tube blowers be prohibited, also steam jets which are used in the stacks or uptakes.

REPORT ON TWIN PEAKS TUNNEL FOR SAN FRANCISCO.

The San Francisco Board of Public Works' report on the Twin Peaks tunnel comprises a description of the project and an estimate of the cost. The general description calls for a tunnel through the Twin Peaks ridge, the northeasterly portal of which is to be situated near the easterly line of Collingwood street 64 ft. southerly from Seventeenth street. The southwesterly portal is to be situated in the Rancho San Miguel at a point near the intersection of the projected center lines of Twelfth avenue and Taraval street. Two additional entrances to the tunnel are to be located where the tunnel will run under Eureka street and where it will run under the southerly boundary line of the Relief Home Tract.

Generally the main bore of tunnel is to be constructed to be approximately twenty-four feet wide in the clear and to be properly bored and properly and suitably lined with masonry where necessary, said masonry to be re-enforced where necessary, and with suitable and convenient excavations for and construction of stations at said tunnel entrances above mentioned, properly lined and faced with suitable material, with convenient and suitable platforms and passageways and conveniences; the sides of said approaches by means of open cuts to be properly supported with proper and suitable retaining walls or bulkheads with proper coping and balustrades or railings constructed of masonry to be re-enforced where necessary, and said portals or entrances to be properly constructed of masonry; said tunnel to be furnished with proper shafts for ventilation at necessary points and with suitable provision for drainage and to be provided with all appurtenances necessary to make said tunnel fit and convenient for public use.

Two districts have been selected as being benefited by the proposed improvement and are to be assessed to pay the cost thereof.

The report contains a statement of the estimated cost of the improvements as follows:

Cost of construction	$3,347,823.23
Incidental expenses	125,000.00
Lands taken in fee	511,098.00
Easements acquired	6,528.00
Leaseholds taken	3,840.00
Total	$3,994,289.23

An area comprising nearly one-sixth of the total area of the city, now practically inaccessible, will be brought into quick and easy communication with the business center by means of the tunnel.

The estimated time given the contractor to complete the work is 600 calendar days and a bonus will be given or a penalty exacted of $750 a day as an inducement to the contractor to expedite the work.

The general grade of the tunnel is easy, nowhere exceeding 3 per cent, so that high speeds for electric cars can be made through it.

It is estimated that the time in passing through, including the stop at a subway station at Laguna Honda, should be less than 10 minutes, so that the 15,000 acres of land at the southwesterly extremity of the tunnel will be brought nearer to the business center of San Francisco than either Oakland, Berkeley or Alameda.

Exhaustive borings have been made all along the route, 500 ft. apart, to determine the exact nature of the material that will be encountered in making the bore, so that the contractors will not have to bid blindly on the cost of the work.

All tubing and pipes for electric wires are carried in the concrete sidewalks and niches for operating these are spaced every 400 ft. apart.

Similar refuge niches are placed on each side, 50 ft. apart for the safety of laborers who may be working in the tunnel.

An elaborate system of ventilating is to be provided by means of separate compartment on the top of the tunnel above five feet high, through which all the foul air will be extracted by means of fans. This is superior to the single opening where cars running at high speed in opposite directions mingle the foul with the pure air.

FACTS FOR OPTIMISTS.

A New York financial house estimates that the wealth of the United States is $130,000,000,000; $50,000,000,000 more than that of any other nation. Our foreign trade balance exceeds the aggregate of 90 per cent of all other countries having favorable trade balances. This country represents 6 per cent of the world's population; we are served by over 40 per cent of the world's total railroad mileage; 67 per cent of its telephone and 20 per cent of its telegraph facilities. The capitalization of our railroads averages $64,000, whereas that of European railroads, many government owned, averages over $126,000 per mile. European freight rates average from 50 per cent to 60 per cent higher than those of the United States. Second and third class passenger rates abroad equal or exceed first class rates here. Our farmers produce 21 per cent of the world's wheat; 40 per cent of the corn and 85 per cent of the cotton. We produce 37 per cent of the pig iron, 67 per cent of the copper, 31 per cent of the lead, and are the second largest producers in the world of both gold and silver.

If our political conditions are not entirely smooth, the same is true of practically every other important country on the face of the earth. If our institutions are not substantial, our very money lacks value. If our securities are not substantial neither are our banks which invest in and loan upon them. If money is conserved through being carried in bank deposits, it is equally so by investment in the same properties that are behind the assets of the banks. If better rates can be obtained on capital invested in equally substantial enterprise anywhere else in the world, that is the place to put capital. But if, upon search, a more substantial field for investment than this country cannot be found, it is surely the part of wisdom to improve what is one of the two greatest investment opportunities of the last decade.

POLES PURCHASED, 1911.

The statistics showing the number of wooden poles purchased in the United States in 1911 by steam and electric railroads, electric light and power companies, and telephone and telegraph companies has been compiled by the Bureau of the Census.

Table 1 shows the total numbers and principal kinds of poles purchased by the several classes of consumers from 1907 to 1911, inclusive.

Table 1—Poles Purchased, Classified by Kinds of Wood: 1907 to 1911.

Kind of Wood.	1911	1910	1909	1908	1907
Cedar	2,100,144	2,431,567	2,439,825	2,200,139	2,109,477
Chestnut	693,489	677,517	608,066	516,049	630,282
Oak	199,590	265,290	236,842	160,702	76,450
Pine	161,690	184,677	179,586	116,749	155,960
Cypress	72,995	75,459	77,677	90,579	100,368
All other	190,112	236,184	196,744	164,936	210,731
Total	3,418,020	3,870,694	3,738,740	3,249,154	2,283,268

In 1911 the total purchases amounted to 3,418,020 poles; of these, 2,402,724, or 70.3 per cent, were purchased by the telephone and telegraph companies; 787,649, or 23 per cent, by the electric railroad and electric light and power companies; and 227,647, or 6.7 per cent by the steam railroads. The total number of poles purchased represents a decrease of 452,674 as compared with 1910, and of 320,720 as compared with 1909; but it exceeds the totals for 1908 and 1907 by 168,866 and 134,752, respectively. The decrease in the purchases of 1911 as compared with 1910 was confined to telephone and telegraph companies and steam railroads, while substantial increases in purchases were reported by the electric railroad and electric light and power companies.

Five kinds of wood—cedar, chestnut, oak, pine and cypress—supplied over 90 per cent of the pole requirements of the United States during each of the five years covered by the table. The preferred species have the general physical qualifications of durability in the soil, strength, lightness, straightness, a surface which will take climbing irons readily, and comparatively slight taper. The various species of cedar combine these qualities in high degree. Cedar poles are cut principally from the white cedar of the Lake states, the red cedar of the Northwest, and the southern white cedar of North Carolina, Virginia and New Jersey. Chestnut is cut principally in the Atlantic Coast States from Georgia to New Hampshire. Oak is very widely distributed species, is cut for poles chiefly in the hardwood states of the Ohio and Mississippi Valleys. Most of the pine reported is that commonly known as southern yellow pine, and includes several species—longleaf pine, shortleaf pine, loblolly pine, and some others. Of these, the most durable is the longleaf pine, while the loblolly pine gives very brief service unless it is treated with a preservative. In the West another species—western yellow pine—is reported, which also requires preservative treatment.

Preservative Treatment.

The woods used for poles in the United States are chiefly those which are naturally very durable in contact with the soil. The life of timber under this condition varies considerably according to the species, to differences in the wood of the same species, to the character of the soil, and to climatic conditions. Cedar, chestnut, cypress, juniper, and redwood usually last

from 10 to 15 years, while white oak has an average life of somewhat less than 10 years.

The resistance of poles to decay can be considerably increased by the use of preservatives. Wood preservation is now on a firm footing in the United States, but the advantages which this practice affords are by no means fully utilized by pole consumers. Preservatives not only add from 3 to 15 or more years to the service of the woods now commonly used for poles, but also make it possible to use cheaper woods which in their natural condition lack durability in the soil although possessing all the other qualities necessary in pole timber. The durability of woods which ordinarily last but a few years can thus be increased to more than double the normal life of cedar.

Poles may be treated by the application of the preservative to the entire pole or only to those parts which commonly decay rapidly in the locality in which it is used. The preservative may be applied with a brush; the pole may be dipped or stood in an open tank containing the preservative; or the entire pole may be inclosed in a cylinder full of a preservative and subjected to sufficient pressure to cause it to penetrate the wood. In the United States poles are commonly treated simply by the application of one or two coats of the preservative with a brush. This is the cheapest and most convenient method, but also the one which adds the least service, since the penetration of the wood by the chemical is usually relatively slight. A comparatively small number of poles are treated in open tanks or in closed cylinder tanks and the wood thus much more thoroughly protected. About 181,000 linear feet, or the equivalent of 7240 poles 25 ft. long, were treated in tanks in 1911.

The total number of poles which received some kind of treatment in 1911 was 656,504, or 19.2 per cent of the total number purchased. In 1910, 824,673 poles were treated, or 21.3 per cent of the total number purchased in that year.

Practically all the poles were treated by the less effective methods, which add but relatively few years to the service of the wood. Of the total number treated, cedar poles constituted two-thirds, and cedar, yellow pine, and chestnut poles together amounted to 91.8 per cent. From this it is apparent that treatments were applied principally to durable species. Less than 100,000 poles of the less durable species, which include some of the species classed under yellow pine, all of the western pine, white pine, and tamarack, were treated. It is apparent that the opportunities which exist for making first-class pole timbers from the less durable woods are not being utilized to any considerable extent, and that pole consumers have first turned their attention to increasing the durability of the woods which they have already been using. Loblolly pine of the Southern states, lodgepole pine, western pine of the Rocky Mountain region, and many other woods deserve careful consideration as prospective pole timber, since they take treatment readily and in many places offer consumers a chance to use local woods instead of shipping poles from distant regions at considerable cost.

The principal preservatives used for treating poles are those classified as refined coal-tar oils. Under this heading are included creosote oil and various proprietary preservatives reported as carbolineum, C. A. Wood Preserver, S. P. F., and others. The bulk of the poles in this class were treated with the proprietary preservatives. Creosote oil was used in treating 159,321 poles, of which 50,021 were cedar and 83,035 yellow pine.

Wood preservatives properly refined from coal tar are considered among the most effective known when properly applied. Coal tar was used in the treatment of 43,659 poles, three-fourths of which were cedar.

Over 14,000 poles were treated with paint—a preservative concerning the effect of which little is known. Judging by tests which have been made on greenhouse timbers, probably two or three years' life is added by the use of paint.

Charred poles in experimental lines have shown less decay than untreated poles. Poles are often charred by painting them with crude oil and burning the oil. Crude oil alone has proved a valuable preservative when the wood was thoroughly saturated with it, but when the poles were merely painted with this preservative, or the oil used in quantities around them when they were set, the results have proved unsatisfactory.

The cost of treating poles varies according to the wood treated, the kind of preservative and quantity used, and the process employed, but it is only in rare instances that the adoption of a pole-treating policy is not economical. The United States Forest Service has a large number of poles treated by different methods under record and subject to annual inspection in order to determine the relative values of the different methods and preservatives.

Oil pipe lines are not common carriers according to a recent ruling of the Federal Court which finds the regulation unconstitutional which places them under the jurisdiction of the Interstate Commerce Commission.

The value of "n" in Kutter's formula for water flowing in open concrete lined and earth canals has been determined from a large number of observations by the U. S. Reclamation Service. The nature of the data does not justify the formulation of general conclusions as to the proper value of "n" to be used for different materials, but the values heretofore generally used, namely: .012 to .014 for concrete and .020 to .025 for earth channels, seem to be substantiated.

An electrically-heated school house is to be built at Rupert, Idaho, the principal town on the North Side Minidoka reclamation project, current being supplied by the U. S. Reclamation Service. Fresh air will be blown over the heating elements and thus ventilation will be secured with heat. The school will also have a household economics room equipped with a large electric range and 12 individual electric stoves. There will also be a large water-heater for supplying hot water for all purposes in the building, including the baths for the gymnasium. The lighting system will include provision for a moving picture machine in the auditorium.

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POWER AND GAS

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Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advrtisers should mail copy at least thirty days in advance of date of issue.

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FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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Regulations for Line Construction in Oregon

In accordance with the plan that all electrical construction be "just reasonable and safe" the Oregon Railroad Commission has issued tentative regulations governing overhead and underground construction of telegraph, telephone, signal, trolley and power lines in the State. The provisions are so nearly identical with those in California as to lead to the conclusion that one formed the model for the other, with certain improvements which have been suggested by use.

In the main these rules are good. While they increase the cost of construction they minimize the chance for accident. Freedom from accidents, whether to materials or men, is the one factor above all others that makes for success in supplying power, light, transit or communication. Anything which promotes safety should be welcomed with open arms. Substantial line construction, careful location of wires and ample clearances prevent many accidents.

Experience has shown that the fifteen-inch clearance between any wire and pole gives sufficient climbing space so that none but a careless lineman is in danger. The wisdom of the grounded neutral is also admitted, as well as the requirement that all high-voltage wires be short-circuited and grounded while men are at work on them. No serious objection can be raised against these requirements but to require a six-foot clearance for all voltages between 600 and 15,000 works an unnecessary hardship on many 2200 volt distribution systems. The recognition of 6600 volts as an intermediate voltage would thus make a four-foot clearance equally safe.

The Oregon Commission also displays a commendable desire to act in a just and reasonable manner by giving the companies an opportunity to file any protest to this tentative order. While their foresight can prevent accidents, it cannot always anticipate objections. Proper co-ordination of their efforts should do much to strengthen both the commission and the company in public esteem.

Lumbering Electrically

The application of electric power to lumbering represents not only the greatest single advance which has yet been made in that industry but also the most notable victory in the campaign for the industrial utilization of electricity. The difficulties have been many. Enormous fluctuations in demand for power, great variation in material to be handled and sudden changes in the speed of machines, makes the problems of proper control almost as difficult as those of motor adaptation. New means have been devised and old methods superseded in the face of the opposition of many lumbermen, proverbially the most conservative of men. Because the steam engine had sufficed in the past was sufficient reason for its persisting in the future. Coupled with this conservation there has existed a disregard

for human life, a carelessness as to the timber loss, and an indifference as to power efficiency which have made lumbering the most wasteful of all work.

But the errors of conservatism are now being overcome by the truths of conservation. Safety devices are being introduced into the mills and camps, by-products are made from former refuse, fires are fought and power saved. With a central plant power can be generated and distributed far more efficiently than by portable engines and boilers, where scale removal and fuel saving are seldom tried. By this means also boiler explosions and forest fires may be minimized, especially where the "donkey-man" performs other duties which take his eye from the water-gauge and his hand from the damper. Individual motor drive is far more economical than the maze of belts, hangers and pulleys required to transmit power from a steam engine; it also removes an ever-present danger to life and limb. In fact, electricity is safe, cheap and convenient, the ideal power for the lumberman.

Of the many articles which have been published in these columns regarding electricity in the saw mill, electrical logging and other application, that in this issue represents the greatest advance which has yet been made in the application of electric power to the planing mill. Credit is due to the engineer who worked out the details of this installation and honor must be accorded the business man whose faith has made it possible. It has not always been easy to get the money for such radical changes. The laurels belong to such men as Everett G. Griggs, president of the West Coast Lumber Manufacturers' Association, and a consistent advocate for electric drive, whose example has inspired others to dovetail their efforts with his to bring about the complete electrification of the lumber business.

Denial of Rumors

Various rumors have been circulated during the past week regarding the Pacific Gas & Electric Company and the Great Western Power Company. Fact and fancy have been so interwoven that a statement of a few authoritative facts seems advisable. The contract whereby the Pacific Gas & Electric Company purchased 25,000 h.p. from the Great Western Power Company has been renewed, pending the completion of the former company's Lake Spaulding development. Construction is being pushed on the Spaulding dam so that sufficient water will be available for several units to be installed in the Drum power house by the beginning of 1914, a force of about two thousand men now being at work. Due to the stringency in the money market work has been discontinued on other parts of this development in order that all possible resources can be concentrated on the early completion of the Drum power house. The diminished efforts at Lake Spaulding are in no way concerned with a possible merger between the two companies.

Rates

The old fallacy of a uniform charge to all electric consumers, after having been repeatedly downed, is again being proposed as a means of preventing rate discrimination by electric companies. The refuting facts have been told so often as to make their repetition almost monotonous, yet their reiteration seems necessary to demonstrate the absurdity and inconsistency of such a proposal.

To impose the same charge for all kinds of service to all classes of consumers is to ignore the first principal of business, which bases price on cost. It costs as much to build a pole line to a small cottage as to a large factory an equal distance from the plant. The cottage takes little current, but takes it at a time when the system is most heavily loaded; the factory uses most of its power at times of least demand. Few people realize how much apparatus must be kept in reserve to meet their needs at any time of the day or night. This may be likened to keeping a garage filled with idle automobiles instantly ready with a driver at the request of any or all the people at any time. Alternating current cannot be stored, but must be generated on demand. Readiness to serve this demand means an enormous initial cost of equipment, and it costs almost as much to run it lightly loaded as at times of heaviest load.

The expense is necessarily divided among the users. If some factory or electro-chemical works can employ the available unused power at times of light demand, it will naturally lessen the average charge to other consumers. But to charge such a large consumer the same rate as is borne by the short-hour consumer would make the price prohibitive. Enforcement of a uniform high rate would in this way defeat its own purpose and ultimately restrict the sale of central station current to the small consumer. On the other hand, it is commercially impossible to sell current to the small consumer at the low price now given a large off-peak consumer.

The foregoing is argued upon the assumption that supplying electricity is like any private business which depends upon selling goods at wholesale more cheaply than at retail. While this has been true in the past, the question is now being raised whether a railroad, a telephone or a power company is not more public than private in nature. The establishment of various regulating commissions has been one result of the feeling that they are private agents conducting public business.

While the public concedes the necessity for rate discrimination in private business, it demands equality of rates for public service. The postal and customs services are examples of federally owned businesses giving equal rates to all, the telegraph and railway business exemplify the situation under private ownership. Electric light and power companies will ultimately also be obliged to recognize the public quality of their management as paramount to the private quality. But until this time comes, the obligation to stockholders compels the company to make different charges to different classes of consumers.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

H. A. Sayles, Holabird-Reynolds Company's San Francisco office, was in Sacramento this week.

A. L. Orman, local auditor General Electric Company, was in Seattle recently on a ten day business trip.

R. W. Nicol, manager of the Salt Lake Electric Supply Company, has been at Denver on a short business trip.

H. R. Noack, president of Pierson, Roeding & Company, San Francisco, has returned from an extended trip East.

E. C. McBrearty, of the American Electric Heater Company, Detroit, Mich., is at San Francisco on his semi-annual trip.

J. W. Thompson, H. W. Johns-Manville Company's San Francisco office, is spending a pleasant vacation in Yosemite Valley.

P. B. Hyde, representing Thomas A. Edison, has returned to San Francisco, after a short trip through the northwest.

J. B. Shay, chief stores manager Western Electric Company with headquarters in Chicago is making an inspection tour of western branches.

Grover Anderson, who represents the Electric Appliance Company in Arizona, is at his home in San Francisco recovering from an attack of typhoid fever.

G. W. Van Auken of Cache county has moved to Pleasant Grove to work for the Utah Power & Light Company at their Battle Creek plant, near Salt Lake City.

E. M. Cutting of the Edison Storage Battery Supply Company, left during the week for an extended trip taking in California and the north Pacific Coast states.

Fred A. Wood, northwest manager Gamewell Fire Alarm Telegraph Company, with headquarters at Seattle, is making a two weeks' business trip to Southern Alaska points.

C. O. Poole of the Southern Sierras Power Company, Los Angeles and Mr. Chatfield, manager of the Nevada-California Power Company, at Bodie, were recent visitors at San Francisco.

J. D. Hull, Seattle, actively engaged in power installation work, is making a three weeks' business trip to the east and will visit New York, Chicago and other points during his absence.

J. F. Perry, former salesman Wagner Electric Manufacturing Company, has become connected with the Krogh Manufacturing Company, San Francisco, as general sales manager.

L. Heyneman, manager Pacific Coast branch Goldschmidt Thermit Company, has returned from Los Angeles and San Diego where he has been in connection with work done for the San Diego & Southeastern Railway.

V. A. Welman, chairman of the Seattle Jovian degree team committee, has resigned and **L. L. Brown** of the Western Electric Company, was selected to take his place. This committee is making active preparations for the rejuvenation to be held on September 4.

A. H. Noyes, who resigned his position with the Electric Appliance Company some time ago, to go into the electrical contracting business, has given up his business at Grants Pass, Ore., to accept a position with this company and will represent them in Washington, Oregon and northern California.

W. C. Orem, president of the Salt Lake and Utah Railroad, has just returned from the East where he placed orders for cars and equipment for the interurban line now in course of construction south from Salt Lake City into Utah county. He reports that the new road should be ready for business at least between Salt Lake and Provo by January 1, 1914. The interurban cars which he ordered last week will contain many features new to this region. Among others, it is proposed to provide a buffet dining compartment on some of the cars. They will be geared for a maximum speed of sixty miles an hour.

O. A. Honnold and **L. L. Dagron,** engineer of the Utah Light & Railway Company, were in Ogden recently inspecting the reconstruction of the company's pioneer plant located at the mouth of Ogden Canyon. New and improved water wheels, buckets and generators have replaced the ones originally installed when the plant was started in 1896. An eight-acre equalizing reservoir, which will enable water to be stored during the daylight hours, has been built below the plant. When these improvements are completed, the capacity of the plant will be increased from approximately 3200 to 5200 kw. for peak purposes.

OBITUARY.

Morris Fretwell, a maintainer in the signal service of the Southern Pacific Railroad, touched a high tension wire on top of a pole at the intersection of the railway line and Twenty-first street, Ogden, and was instantly killed. The eleven thousand volt line with which he came in contact, supplies energy for the block signal system extending west from Ogden and across the Lucin cutoff.

H. J. Woebke, sales agent for the Salt Lake branch of the American Steel and Wire Company, was killed in an automobile accident in Salt Lake City on the evening of July 30th. He was pinned beneath the car after tipping over and sliding down a twenty-foot embankment, and died at the emergency hospital about an hour after the accident. O. W. McGill, travelling agent for the Salt Lake Hardware Company, who was driving the car, sustained a broken rib

H. J. Woebke

and internal injuries, but his chances for recovery are good. Mr. Woebke was a member of a well-known California family, a native of San Francisco, and is survived by brothers and sisters in that city. He came to Salt Lake City as representative for the American Steel and Wire Company six years ago. Mr. Woebke was a member of the Commercial Club of Salt Lake City, the Utah Electric Club, and the Jovian Order. Funeral services were held in Salt Lake on July 31st. Mr. Vin Conely accompanied the remains to San Francisco.

MEETING NOTICE.

Electrical Development and Jovian League.

The entertainment committee of the League, A. E. Rowe, chairman, has arranged for a number of interesting meetings. For the first meeting (September 2), Robert Newton Lynch, executive head of the Chamber of Commerce of San Francisco and the California Development Board, is to address the members. Mayor James Rolph Jr. is scheduled to speak at the meeting on September 30th. Jovian Day is set for September 23 and Statesman A. H. Halloran is taking care of the events of the day. There will be no meeting on September 9, it being a holiday, and the business meeting which would ordinarily be held on that date, has been set for Tuesday, September 16.

TRADE NOTES.

The Salsich Lumber Company of Salsich, Washington, has purchased a 100 h.p. General Electric motor to operate a John K. Miller blower.

Hunt, Mirk & Company, Inc., San Francisco, are making an extension to the steam plant of the United Light, Fuel & Power Company at San Diego.

The Industrial Engineering Company, Oakland, Cal., recently changed the installations of the Monarch Oil Company from direct to alternating current when the plant was abandoned in favor of central station service.

The Allis-Chalmers Manufacturing Company has just closed a contract with the Oregon Lumber Company of Dee, Oregon, for an electrically operated saw and planing mill at Dee. About 800 h.p. of induction motors will be installed.

Buxbaum & Cooley, Seattle, are putting a 70 point annunciator on the steamer Solduc and are also putting new electrical equipment in the steamer Harvester and overhauling the electrical equipment of the steamer Navajoe.

The Skinner Engine Company recently installed two of its horizontal center crank engines at the Monroe state reformatory direct connected to two Allis-Chalmers generators of the three-wire type, 75 and 100 kw. respectively.

The Seattle branch of the Pacific States Electric Company has recently supplied a number of cities, including Cashmere and Aberdeen, Wash., with the Union Metal Manufacturing Company's steel street lighting standards.

Nixon Kimmel of Spokane has awarded to Pierson, Roeding & Company, Seattle office, contract for aluminum cable and insulators for his irrigation project in southern Washington.

Kilbourne & Clark Mfg. Company, Seattle, were the low bidders on wireless telegraph apparatus for which bids were opened in Washington July 29, at $64,410. The equipment consists of 15-5 kw. sets to be delivered at the navy yard, New York.

The National Tube Company, Pittsburgh, Pa., announce that they will enter the electrical conduit field. They have secured the National Metal Molding Company and the Safety-Armorite Conduit Company, both of Pittsburgh, Pa., as their agents to manufacture and sell this product.

The Line Material Company, South Milwaukee, Wis., manufacturers of insulator brackets, outdoor lighting brackets, and other line construction material, announces the establishing of a western office at 229 Sherlock Building, Portland, Oregon. Offices have also been established at 114 Liberty street, New York and at 915 Olive street, St. Louis, Mo.

W. R. Hendry & Company, Seattle, have charge of the complete electrical installation for the Issaquah Coal Company, Ltd., at Issaquah, Washington. The plant will consist of a number of induction motors for operating the tipple, washing and screening plants. An Ingersoll-Rand air compressor driven by a 300 h.p. synchronous motor is being installed together with an electric haulage system.

FINANCIAL NOTES.

The Tacoma Railway & Power Company, a Stone & Webster concern, has filed its semi-annual statement showing its power business for the first half of 1913. The total business transacted amounted to $35,370. The passenger street car business for the first six months of 1913 shows an aggregate amount of $419,166. The Pacific Traction Company's report for passenger business shows a total of $36,939, while the freight business amounted to $28,198, and the freight business amounted to $314.

The Utah Securities Corporation has made a call of the ten-year six per cent notes of that corporation. This makes sixty per cent in calls made upon the underwriters, the last previous call having been of five per cent on June 23d. In the fall of 1912 $27,000,000 of these six per cent notes were underwritten by a large syndicate, and at that time it was not expected that more than thirty per cent of the amount subscribed would be called, as it was thought that the notes would be retired by the sale of bonds of the Utah Power & Light Company. The stringency of the money market and the lack of the demand for bonds especially of new issues, have prevented the expected refunding of the notes.

The Pacific Gas & Electric Company has applied to the Railroad Commission for authority to issue $5,000,000 of convertible general lien bonds in place of the $5,000,000 convertible debentures previously authorized by the commission. The effect of this is merely to change the form of the debenture mortgage. The company asks for authority to pledge for notes these general lien bonds and the $5,000,000 first and refunding bonds previously authorized. It is proposed that the aggregate amount of such notes shall not exceed $7,000,000, and that they shall mature in June, 1914. The company asks also for authority to issue notes for $1,192,500 at this time which shall be taken up by collateral trust notes. The purpose of the company, in general, is to pledge the $10,000,000 bonds and to use the proceeds for the prosecution of work upon its Bear River development and for general expenditures over its system. These are the purposes for which the $10,000,000 in securities were authorized.

The Western Power Company has sold to William B. Bonbright & Company, Inc., $1,250,000 collateral trust 6 per cent two-year notes, dated July 18, 1913. The notes are being offered at 98 and interest or on a 7 per cent basis. As security there have been deposited $849,000 par value Great Western Power first 5s, $533,000 par value City Electric first 5s, $700,000 par value California Generating Company 6 per cent preferred stock, a total of $2,082,000 of collateral. At market prices this collateral is in excess of 25 per cent above the amount of notes to be issued under it. Western Power's balance, after charges and guaranteed dividends for the year ended June 30, 1913, was $396,002, or approximately five times the requirements for these notes.

For the first five months in 1913 Los Angeles Gas & Electric increased gross earnings $320,322, or 17 per cent, while net earnings for the same period increased $150,000 or 17 per cent.

Santa Barbara Gas & Electric for four months ended April 30, 1913, increased its gross $4757, or 4 per cent, while net increased $11,300, or 12 per cent, operating expenses having been decreased by $6456, or ½ of one per cent.

NEW CATALOGUES.

"Automatic Electric Cooking" is the title of a new illustrated booklet recently issued by the Berkeley Electric Cooker Company, Berkeley, Cal. The economy and cost of electric cooking is discussed from a practical standpoint. The booklet contains a clear explanation of the operation of this company's Type C cooker and shows its possibilities as a central station load builder.

INDUSTRIAL

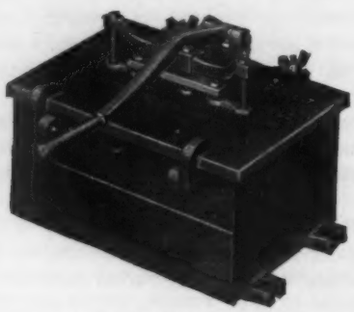
IRONCLAD ENCLOSED FUSED SWITCHES.

A line of ironclad enclosed fused switches developed by the Detroit Fuse & Manufacturing Company of Detroit, Michigan, employs an entirely new principle of knife construction. They comprise a suitable cast iron case with rabbeted, rubber gasketed, and hinged door or cover which is provided with hinge bolts and wing nuts for locking and sealing. The switch mechanism is of the spring actuated double break plunger type, controlled from the outside of the cast iron enclosing case, without any possibility of accidental contact.

Ironclad Fused Switch.

These switches are quick-make and quick-break. The capacities which are now ready for the market involve the double and triple pole type, up to and including 200 amp., 250 volt, and have been approved by the Underwriters' Laboratories.

This line also includes an a.c. starting switch, a distinctly new ironclad device designed to overcome any occasion to follow the dangerous and oftentimes costly practice of over-fusing a.c. motors. By its use it is possible to fuse these motors for their running load, the fuses being paralleled by automatically removable short circuiting bars, which are in circuit with the fuses only when the switch is in the starting position. The switch may be sealed shut to protect it against tampering, or the possible use of fuses of too large capacity.

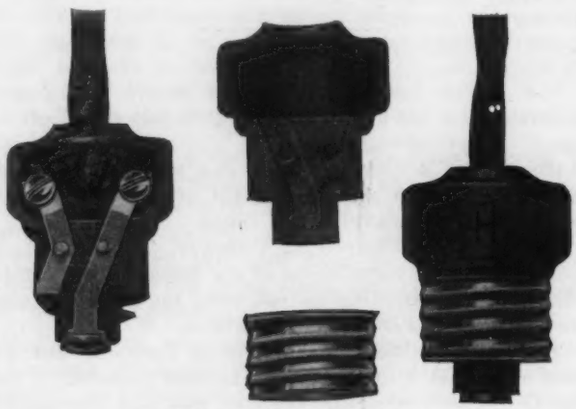


A. C. Starting Switch.

To start the motor, the starting lever is thrown in as far as possible; this operation switches the motor directly on to the service and at the same time connects the short circuiting bars in shunt with the fuses. It is necessary to hold the starting lever in this position until the motor has attained full speed, when the hand may be removed from the starting lever. A spring actuated spreader carrying the fuse short circuiting bars is automatically withdrawn without opening the circuit, leaving the fuses themselves in circuit. To stop the motor, all that is necessary is to pull the lever toward the operator, which opens the circuit by removing the fuse connections therefrom.

NEW CUTLER HAMMER "SPLIT" ATTACHMENT PLUG.

The saving of time in wiring the new No. 7605 "Split" attachment plug marketed by The Cutler-Hammer Manufacturing Company of Milwaukee is the feature of greatest importance, especially to the manufacturer using many plugs with his product. While having the appearance of a solid plug, it separates into halves, facilitating wiring. Removing the screw shell of this "Split" plug allows it to be separated



"Split" Attachment Plug.

into two halves exposing large binding screws for securing the cord. This can be easily and quickly done. Unlike other solid plugs, there is a large space for the knot. The method of locking the screw shell in place after the cord has been secured and the halves placed together is very ingenious. The bottom of the screw shell has a large number of crescent shaped perforations one of which when the shell is screwed in place engages with a latch, securely locking the shell in place, preventing it from being turned backwards and holding the plug halves together. A friction wiping contact entirely independent of the locking latch makes electrical connection with screw shell.

The plug is sent out with the screw shell in place but not locked so that it is only necessary to unscrew the shell and wire the plug, after which the halves are placed together and the shell screwed on until locked. If it is desired to unlock it at any time a pen knife or screw driver can be used to press the latch down which permits unscrewing the shell.

Black heat-resisting thermoplax is used for the body of the plug, which is of neat, substantial appearance. The small size makes it at once suitable for a great variety of uses for which separable cap plugs are not required. The illustration show the simplicity of this device and indicate the method of taking apart for wiring. A reducing bushing is provided so that ordinary, reinforced or silk cord may be used.

AUTOMATIC PACKAGE TIER.

One of the latest labor saving devices to make its appearance is the automatic package tier. It is designed primarily for tying mail matter into packages, but has many other applications besides. It takes bundles of from 25 to 50 letters, and in 2½ seconds binds them into a neat, compact package and drops them into the mail bag or other receptacle. Where much mail matter is handled, it permits a reduction of the clerical force and enables earlier mails to be caught. The machine is made by the Automatic Package Tier Company of Chicago, Ill., and is operated by a 1-8 h.p. Westinghouse small motor which takes current from the lighting circuit.

NEWS NOTES

INCORPORATIONS.

LOS ANGELES, CAL.—The Hydraulic Clutch Company, with a capital stock of $500,000, of which $400,000 has been subscribed, has been incorporated in this state by A. J. Clipper, A. H. Jessen and J. H. Fairfield. A new plant will be started at once.

SAN DIEGO, CAL.—Articles of incorporation of the Cuyamaca Water Company, with capital stock of $1,000,000 have been filed. Investigations of complaints against the company will be started by the State Railroad Commission at once. J. A. Murray and Col. Ed. Fletcher are the principal stockholders of the company.

ILLUMINATION.

TACOMA, WASH.—The St. Paul & Tacoma Lumber Company will build an 1800 h.p. isolated power plant to cost $10,000.

TWIN FALLS, IDAHO.—This town is taking figures for the installation of a street lighting system. Approximately 90 street lighting standards will be used.

CLATSKANIE, ORE.—Additional equipment will be added to the electric light plant here which has recently been obtained by a syndicate of which W. W. Seymour of Tacoma, Wash., is the head.

LOS ANGELES, CAL.—The Suburban Homes Company contemplates turning over its boulevard to the county so as to obtain permission from the supervisors to form a lighting district to territory, including the boulevard. It is desired to install ornamental lights along the entire roadway.

MADERA, CAL.—George W. Kitchen and John Beals of Los Angeles have completed the new gas plant for this town. The plant has a capacity of 10,000 ft. per hour and a storage capacity of 30,000 ft. Four-inch mains and two-inch laterals have been laid through the new townsite. The cost of installing the plant and laying the mains was $25,000.

SACRAMENTO, CAL.—The commissioners have unanimously resolved that an appeal to the supreme court for a ruling on the legality of the $2,633,000 bond issues providing for the extension of the water mains, the electric light plant and the hall of justice offered the best solution of the difficulty in determining the validity of the issue.

REEDLEY, CAL.—The franchise for supplying this city with gas has been sold to the Alta Gas Company. The necessary material for installing the plant will be ordered at once and the work will begin immediately. The franchise provides that the company is to furnish gas for lighting and heating purposes at a rate not to exceed $1.25 per 1000 cu. ft.

MARSHFIELD, ORE.—The Oregon Power Company has made a 28 per cent reduction in its rates on electricity here to go into effect as soon as the Oregon Railroad Commission approves the new schedule. The company recently took over the electric franchises at Coquille and Myrtle Point and intends supplying current from a central plant at Marshfield to North Bend, Marshfield, Eastside, Coquille, Myrtle Point and other towns in the county.

TRANSMISSION.

DAVENPORT, WASH.—The Washington Water Power Company, Spokane, has been granted a 50-year franchise by the county commissioners to operate power and lighting lines to Creston, Wilbur and Almira.

REDLANDS, CAL.—Work begun last year upon the Baldwin power plant, in Mill Creek Canyon, east of Forest Home, will soon be resumed. It is planned to build a $350,000 power house and develop 2500 horsepower.

PHOENIX, ARIZ.—The contract for construction of the Crosscut power house at Hole-in-Rock, has been let to Marin & Gallis by the board of governors of Salt River Valley Water Users' Association. The cost will be about $42,000.

WASHINGTON, D. C.—Authority for the development of an electric project, with an ultimate capacity of 359,000 h.p. on the Pen d'Oreille River, Washington, has been granted to the International Power & Manufacturing Company.

MARTINEZ, CAL.—A contract has been awarded to H. R. Ingram of this city by the Pacific Gas & Electric Company for the construction of a reinforced concrete and steel electric substation at the Associated Oil plant on Avon. Power for the refinery will be supplied from this section, which will house five transformers.

AUBURN, CAL.—A deed has been filed here whereby the Pacific Gas & Electric Company takes over the rights, reservoirs, ditches, etc., of the United Water & Power Company in Placer county. The purchase of the United company's property was of importance to the Pacific company's plans of enlarging its system in Placer county.

BOISE, IDAHO.—State Engineer John H. Lewis of Oregon made a proposal to the State of Idaho, through Governor John M. Haines, for Idaho and Oregon, with the assistance of the Federal Government, to work co-operatively to secure information on which to base legislation that will result in the development of power to lift water to high lands along the Snake River for irrigation purposes, and at the same time form locks to make the river navigable both east and west from Huntington. In Snake River between Huntington and Lewiston there is a fall of about 1300 ft. With the construction of dams to utilize this fall approximately 800,000 horsepower can be developed.

TRANSPORTATION.

SEATTLE, WASH.—The Board of Public Works will receive bids until August 21 for trolley wire for the municipal railway.

SAN DIEGO, CAL.—The Los Angeles & San Diego Beach Railway, commonly known as the La Jolla line, of which E. S. Babcock is president, will be transformed into an electrical trolley line as soon as possible.

LOS ANGELES, CAL.—Specifications for forty-five all-steel passenger cars that the Pacific Electric is to order shortly are nearing completion. These cars will be ordered as part of authorization of $1,554,911 for the purchase of rolling stock.

SAN FRANCISCO, CAL.—An announcement of the special bond election to be held next month for the issuing of $3,500,000 in bonds for the purpose of constructing a system of municipal railways was authorized in a resolution adopted by the supervisors.

COLTON, CAL.—In order to provide a short cut-off, the Crescent City electric line will be connected with the Southern Pacific road at Bloomington, according to present plans. A switch will leave the trolley line a short distance from the present terminus on Cedar avenue.

OAKLAND, CAL.—All-steel, center entrance, pay-as-you-enter street cars of an entirely new type were placed in service by the Southern Pacific Company when it started its cross-town line on August 1st. Passengers board and leave the cars by three doors set in the middle of the car on the side.

SAN DIEGO, CAL.—A car barn of concrete and hollow tile, occupying a ground area of 200x300 ft. and having a storage capacity of 100 cars, will be erected immediately on University Heights by the San Diego Electric Railway Company. The plans are being prepared in the office of Engineer Andrew Ervast.

SALT LAKE CITY, UTAH.—Dr. E. D. Woodruff, president of the Commercial Club, Joseph Geoghegan, and other prominent residents of Capitol Hill, have presented a petition to the Utah Light & Railway Company requesting that passenger service be instituted on the freight line which runs up Capitol Hill and to the new Capitol grounds.

PRINEVILLE, ORE.—After negotiations covering practically a year, a final contract has been closed by the citizens' committee and H. P. Shell of Tacoma, Wash., for the construction of a railroad from Metolius to Prineville. Preliminary work will be commenced at once and construction of the road will follow immediately.

SAN FRANCISCO, CAL.—The city attorney has been authorized by the supervisors to file an application with the attorney-general for the revocation of the franchise held by the United Railroads enabling it to operate an extension on the Post street line into Market street. The franchise stipulated certain work to be done within a limited period, with which, it was said, the railroad had not complied.

SEATTLE, WASH.—David Swank has asked the city authorities of Seattle and the King county commissioners for an extension of the franchise granted to him by the county commissioners five years ago for constructing an interurban railway from Seattle to Everett. Part of the territory involved has been annexed to the city since the franchise was granted. Some work has been done on the grades but not enough to keep the franchise alive, same expiring in September.

TELEPHONE AND TELEGRAPH.

TOMBSTONE, ARIZ.—The Navajo-Apache Telephone Company is making arrangements to extend and improve its lines and will open exchange offices at Concho and Springerville.

SAN FRANCISCO, CAL.—A resolution has been passed by the supervisors providing $1500 from the urgent necessities fund of 1912-13 for the use of the city attorney in the pending telephone rate litigation.

YUBA CITY, CAL.—Upon the application of the Colusa Telephone Company for a franchise to build its lines into Sutter county the supervisors have made an order that the franchise be sold to the highest bidder on September 15th.

BISBEE, ARIZ.—The Mountain States Telephone & Telegraph Company, to meet increasing demand for long distance service to the east, will install a second wire between Bisbee and El Paso, which will serve all southern Arizona points. Work will be started soon.

PORTLAND, ORE.—Federal Judge R. S. Bean, sitting at Portland on July 31st, denied the plea of defendant telephone companies for delay until October 31st in the filing of their answer in the suit brought by the government to dissolve the alleged telephone trust and ordered that the answer be filed not later than September 15th.

REDLANDS, CAL.—The Southwestern Home Telephone Company, with headquarters here has filed a complaint with the commission against the Southern Sierras Power Company, charging that the latter has erected its poles in undue proximity of the poles of the Southwestern Home Telephone Company.

BERKELEY, CAL.—The supreme court of the state will pass on the merits of the controversy between the city of Berkeley and the Pacific Telephone Company relative to the forfeiture of the bonds of the Home Telephone Company when it was merged into the Pacific Company. City Attorney Staats has filed notice of an appeal from the decision of the superior court favoring the corporation.

SEATTLE, WASH.—The Western Union Telegraph Company through its representative E. L. Ritter of Seattle has made the first objection that has yet been offered to the provisions of the law regulating power and transmission wiring. He contends that the new law is not drawn to apply to telegraph wires in the provision relating to more than 300 voltage, explaining that on quadruple work the wires of the Western Union sometimes carry more than this voltage.

WATERWORKS.

NORTH BEND, ORE.—The Simpson Lumber Company has been granted a franchise here to install a water system to supply fresh water for its mills and factories.

OLYMPIA, WASH.—Bids will be received up to September 3d by I. N. Holmes, city clerk, for the purchase of $150,000 in bonds, the proceeds to be used in the construction of a water system.

OXNARD, CAL.—The voters of Oxnard have decided to purchase the water plant and system of the Ventura County Power Company, paying therefor the $30,000 bond issue of municipal street lighting bonds. Transfer of the plant to the city will be made as soon as the legal steps necessary can be taken.

TACOMA, WASH.—With plans prepared by Engineer William B. Short of the Water Department for cutting over all of the South Tacoma mains, a general overhauling of the water mains in the city has begun. About 20 miles of larger mains will be laid in the West End and around Fern Hill. The cost will be approximately $100,000.

ROUNDUP, MONT.—Engineer Henry Gerharz, after a two months' examination and survey of the water property submitted the estimated value of the plant at $32,861.67. He also estimates that a plant could be built including a storage reservoir of 500,000 gallons for $45,050.86, that would give much better satisfaction than the present one. Improvements which would be necessary to bring the plant up to its full efficiency would cost $19,508.32.

HARRISON, IDAHO.—An election will be called as soon as possible to vote on the question of municipal ownership of the water system. The first question is whether the city shall be bonded for $15,000, with which to purchase and maintain a waterworks system; the second whether the council shall proceed to buy from the First National Bank the system at a cost of $10,000, and the third will be the question of the installation of a separate and new system.

SEATTLE, WASH.—Judge Preble of the superior court of Yakima county, Washington, has sustained the order made by the public service commission of Washington, which required the Pacific Power & Light Company to build a storage reservoir and pipe lines at a cost of $244,000. This company supplies water to the city of North Yakima and on the grounds that the water supply of the city was impure and the fire pressure insufficient the commission made its ruling.

SAN DIEGO, CAL.—Joint development by the city of San Diego and the municipal water district of La Mesa all all waters of San Diego River was proposed and discussed at a conference between city officials and the directors of La Mesa district. La Mesa proposes to issue bonds to the extent of $750,000 or $1,000,000. San Diego's share of cost will be determined later. The project involves the construction of a reservoir in El Capitan dam site, reservoir at site of the Old Mission dam, with combined storage capacity of 20 billion gallons of water.